
MSFC NE Wind Data Quality Assurance for Launch Operations

April 2022 Natural Environments
Day-of-Launch Working Group Meeting

Ryan K. Decker

ryan.k.decker@nasa.gov



Agenda

- Wind processing at the Eastern Range (ER)
 - Automated Meteorological Profiling System - Low Resolution (AMPS LR) data
 - Tropospheric Doppler Radar Wind Profiler (TDRWP) data
- Wind processing at MSFC NE
 - AMPS LR data
 - TDRWP data

Eastern Range Wind Processing

- AMPS LR data
 - Automated processing in the system software filters the wind data to remove spurious motions due to balloon oscillation
 - Suspect wind data (large shears, erroneous data, etc.) within the AMPS LR profile are removed by certified ER personnel and replaced with linear interpolation
- TDRWP data
 - Automated procedures in place to quality control the radar return signal and radial velocities
 - Includes checks for signal-to-noise ratio, vertical shear, and excessive propagation of the first guess velocity
 - Manual quality control of TDRWP data by certified ER personnel consists of identifying any suspect winds derived from the TDRWP return signal and, if necessary, adjusting the wind derivation algorithm inputs to derive a more accurate wind estimate
 - Implemented to ensure spurious data in the wind profiles caused from atmospheric and non-atmospheric artifacts are removed
 - If a reasonable wind estimate cannot be made, the QC operator will flag the data as bad

Eastern Range Wind Processing

- TDRWP data
 - Automated and manual quality control will result in the below flags assigned to suspect data
 - Note: Radial velocities are estimated from previous results. Repeated estimates using the same value is known as first guess propagation (FG Prop).

Flag Name	Description	Value*
Manual QC Active	Manual QC has been invoked either at the MMQC or MSC	1
Automated Release	Manual QC has been invoked, but the profile was released automatically because the new data arrived before the operator completed QC activities.	2
SNR Check	One or more of the oblique beams had a SNR less than the critical value resulting in FP prop being incremented.	4
Shear Check	One or more of the oblique beams failed the shear check resulting in radial velocity interpolation and FG prop being incremented.	8
FG Prop	One or more of the oblique beams failed the FG prop check resulting in the radial velocities at the effected gates being replaced with a 5 point mean.	16
Bad Data	The manual QC operator flagged the data at this gate as unreliable.	32
Comms	Communication to the MMQC could not be established; and manual QC has not been invoked on the MSC	64

MSFC Wind Processing

- MSFC wind assessments are based on objective criteria and subjective evaluations
- Quality assurance (QA) procedures are documented in Standard Operation Procedures
- MSFC NE uses software tools to visualize data
- AMPS LR data
 - QA of AMPS LR wind profile is done by comparing to other data sources and assessing data edits made by ER personnel
 - Comparison to other data sources, including previous AMPS LR profiles, TDRWP profiles, Spaceflight Meteorology Group (SMG) forecast, and climatology (Range Reference Atmosphere, RRA)
 - Examine AMPS LR data files for interpolated regions
 - If any balloon profile has interpolated data (Data Quality = “I”) exceeding 24 consecutive altitudes, 2400 ft (731 m), the profile will be rejected and not used
 - Will evaluate back-up AMPS LR profile using same criteria

MSFC Wind Processing

- TDRWP data
 - Quality assurance of TDRWP wind profiles is done by comparing to other data sources and assessing data quality
 - Comparison to other data sources, including previous TDRWP profiles (trends), AMPS LR profiles, Upper Wind forecast, and RRA climatology
 - Evaluate TDRWP data where consecutive data points are flagged by the TDRWP QC system in order to determine if range of flagged data points exceed acceptable altitude range
 - If any TDRWP profile exceeds five (5) consecutive data points, ~2854 ft (~870 m), all with QC values greater than 7 the profile will not be used
 - Evaluate additional TDRWP profiles at adjacent times following the same criteria

TDRWP Data Visualization

